

IN THE UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF OKLAHOMA

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STATE OF OKLAHOMA, *et al.*, )  
)  
*Plaintiffs,* )  
)  
v. )  
)  
TYSON FOODS, INC., *et al.*, )  
)  
*Defendants.* )  
)

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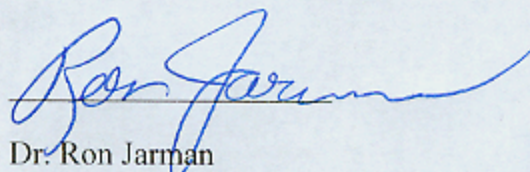
Case No. 4:05-cv-00329-GKF-PJC

**DECLARATION OF DR. RON JARMAN, Ph.D.**

1. My name is Ron Jarman. I am a Senior Environmental Engineer with APEX LLC.
2. I have been retained by the Defendants in this matter to assess the sources of contamination in the Illinois River basin and to comment on the opinions offered by several of the Plaintiffs' expert witnesses.
3. I previously authored and submitted to my clients an expert report detailing my work and conclusions in this matter. I understand that this report was served on Plaintiffs on December 1, 2008. I incorporate that report herein by reference.
4. If called to testify at trial, I would testify consistent with the opinions expressed in that report.

I declare under penalty of perjury that the foregoing is true and correct.

Executed 4 June, 2009.



Dr. Ron Jarman  
APEX Companies, LLC



UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF OKLAHOMA

STATE OF OKLAHOMA, ex rel. W.A. DREW  
EDMONDSON, in his capacity as ATTORNEY  
GENERAL OF THE STATE OF OKLAHOMA  
and OKLAHOMA SECRETARY OF THE  
ENVIRONMENT J. D. Strong, in his  
capacity as the TRUSTEE FOR NATURAL  
RESOURCES FOR THE STATE OF  
OKLAHOMA,

Plaintiffs,

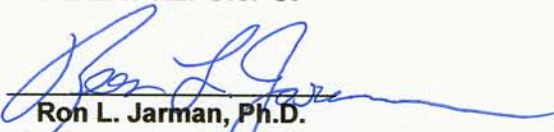
v.

Case No. 05-CV-329-GKF-SAJ

TYSON FOODS, INC., INC., TYSON  
POULTRY, INC., TYSON CHICKEN, INC.,  
COBB- VANTRESS, INC., AVIAGEN, INC.,  
CAL-MAINE FOODS, INC., CAL-MAINE  
FARMS, INC., CARGILL, INC., CARGILL  
TURKEY PRODUCTION, LLC, GEORGE'S,  
INC., GEORGE'S FARMS, INC., PETERSON  
FARMS, INC., SIMMONS FOODS, INC., and  
WILLOW BROOK FOODS, INC.,

Defendants.

EXPERT REPORT OF

  
Ron L. Jarman, Ph.D.  
Senior Environmental Manager



December 1, 2008

each POTW in the IRW as a result of the phosphorus limitations in the relevant permit and other related factors.

To determine the impact of the various regulatory actions and initiatives described above, Apex compiled information from a number of sources to determine the annual loading of total phosphorus into the IRW from specified POTWs. The period selected for determination was from 1989 to 2007. An extrapolation technique was utilized to estimate loadings for the year 2007 as only partial data were available for most facilities. Many of the cities were not required to monitor phosphorus discharges for the entire period. Therefore, actual flows were multiplied by average concentrations measured over the period of record to develop an estimate of loading. Table 4 provides the estimated phosphorus loading discharged to the IRW from nine POTWs. Basic flow and concentration data were not located for the POTWs at Tahlequah, and Westville until the year of 1999. Stilwell data were not available until the year 2001. Therefore, total loadings for 1989 until 2001 should be considered underestimates of the true POTW loading for phosphorus. Graphic depictions of the POTWs total phosphorus loadings for the IRW are presented in Figure 1.

The phosphorus monitored and discharged from the POTWs does not represent the complete contribution of phosphorus from POTWs to the IRW. There are several additional sources of phosphorus from POTWs to the IRW. These include land applied POTW biosolids and sewage bypasses/overflows. The treatment of municipal wastewater includes the separation and conditioning of the solids portion. This material, "Biosolids", contains phosphorus in significant concentrations (roughly 3% total phosphorus) as well as fecal coliforms. Permits for the land application of biosolids are typically issued by the States of Arkansas and Oklahoma through the relevant state agencies. The IRW contains many sites that have been permitted for the land application of this material. Both the ODEQ and the ADEQ have followed this practice, although the issuance of the permits and the application to the land of biosolids has slowed since 2002. Table 5 summarizes the reported tonnage of Biosolids that was land applied in the IRW during the period from 1989 to 2006. Table 6 estimates the tonnage of phosphorus loading in the same manner based on chemical analysis of the Biosolids reported for each city, as available. Figure 2 is a graphic display of Table 6 which demonstrates the annual loadings of phosphorus by year and by city to demonstrate the land application practices since 1989. Since 2002, the City of Rogers has been the dominant POTW applicator of biosolids in the IRW. Figure 3 displays sums of the sources of phosphorus from land applied Biosolids. The City of Rogers has contributed almost half of the phosphorus from Biosolids since 1989.

The general location of the permitted land application sites has been determined for most POTWs in the IRW. *Google Earth* aerial photos of each known location are included as Appendix C.

The accidental release of raw, or partially treated, sewage is not an unusual event in the collection system of a POTW. In general, the older the collection system, the more frequent the accidental releases. In Arkansas these events are called "overflows", in Oklahoma "bypasses." There are many causes for these events including line breakage, blocking or plugging of the lines, construction damage, heavy rainfall, system breakdowns at a lift station or the wastewater treatment plant (WWTP), etc. Response actions to spilled materials vary from complete removal to the WWTP, treatment with lime, washing down to land or storm sewers, and so on. These are reportable events and the notification process must be rapid to comply with regulations.

Bypasses and overflows have introduced phosphorus to the land and waters of the IRW for many years. Records of these events have been sporadic or unavailable for some municipalities. To determine the potential contribution to the IRW from these concentrated sewage releases, the recorded events were compiled along with on-site field notes of the municipal responder which typically provide an estimate of the volume of material released, action taken and fate of materials. Each spill event was then analyzed to support development of an event related estimate of the total phosphorus released to the environment. For some events, the released material was vacuumed into a truck and transported to the appropriate POTW. For such events loading estimates were not included in this evaluation. Some events released materials into a surface drainage feature and the estimate would take the direct nature of that occurrence into account. Because of the complexities of the reporting for bypasses and overflows, coupled with the sporadic nature of the available records, a mathematical approximation approach was selected to estimate phosphorus loadings from these events.

The bypass/overflow reports from each municipality with records (Springdale, Siloam Springs, Rogers, Lincoln, Westville, Watts and Tahlequah) were examined and an estimate developed for phosphorus contribution during the individual reporting period. An average monthly phosphorus contribution was calculated for each municipality for the period of record. Since these events are episodic, an assumption was made that a similar rate and volume of bypass-overflow events would occur outside of the period of record. Then those municipalities for which records were not located (Fayetteville, Prairie Grove, Gentry, Stilwell) were calculated based on the average monthly rate of total phosphorus to the environment from the municipalities for which records were available. Then each municipality was extrapolated over the 19 year period from 1989 to 2007 to estimate the total phosphorus loading to the IRW. The estimated total calculated is 1,805 pounds of total phosphorus entering the environment as a result of bypasses and overflows during the period from 1989 through 2007. Individual reported events and field notation are included as Appendix D. Because not all bypasses and overflows are available, recorded or quantified this estimate should be considered to underestimate the total contribution to the IRW.

## **PUBLICALLY OWNED TREATMENT WORKS AS A SOURCE OF FECAL COLIFORMS**

Some of the claims made by the Plaintiffs relate to the input of bacteria into the IRW. As part of the effort to provide the Defendants with information on the potential for POTWs to contribute fecal coliform bacteria to the basin, an assessment was conducted based on records available from public information collected in this regard.

Bacteria are routinely sampled in a POTW discharge to assure compliance with regulations and the discharge permit. This monitoring information has provided the basis for producing an estimate of the fecal coliforms loading from POTWs that have occurred in the IRW since 1989. Figure 4 displays the estimated fecal coliforms loads which were calculated based on the materials utilized to develop the estimates in Figure 1 and Table 4. Figure 4 reveals a trend toward increased loading of fecal coliforms from POTWs in the IRW. This increase can be primarily attributed to the loadings from Springdale, Fayetteville, Noland West, Rogers and Siloam Springs. Table 7 and Figure 5 displays the results of calculations for the fecal coliforms loadings from biosolids land application practices in the IRW.

## **OKLAHOMA POTW REGULATORY REVIEW**

A review of ODEQ documentation provided by the Plaintiffs reveals a less than aggressive stance with regulatory issues has predominated for many years. The following section is an analysis of the ODEQ files to support this claim. From this review it is apparent that the Plaintiffs practice a great deal of patience in forgiving poor environmental practices by small municipalities and routinely accepting economic excuses for delaying needed upgrades to POTW facilities. This has resulted in the delaying of phosphorus reductions to the IRW from POTW operations.

Each Oklahoma POTW, located within the IRW is summarized as follows:

### **Tahlequah Summary**

The City of Tahlequah, with a population of 14,458 in the 2000 Census, maintains an advanced wastewater treatment system composed of biological treatment by sequential batch reactor, a cascade aerator, gravity filtration and ultraviolet disinfection. Sludge is processed by gravity belt thickening, aerobic digestion and belt filter press followed by sludge drying beds. Sludge is currently disposed by land application at one of three permitted sites located outside the IRW. Prior to the 1998-99 period, some of the land application sites were located within the IRW.

Tahlequah originally received an NPDES Permit No. OK0026964 which became effective on July 1, 1974. Permit limitations were included for BOD<sub>5</sub>, total suspended solids and fecal coliforms. From its inception in 1974 until June 30, 1977 the permit limits were the standards for secondary treatment. After June 30, 1977 the limitations dropped for BOD<sub>5</sub> and total suspended solids, but remained at 200 and 400 number/100 ml of effluent (ODEQ-103-0000444). For the time these were aggressive limits.

TABLE 4

WWTP	ESTIMATE PHOSPHORUS LOADING FROM IRW POTWS									
	Annual Phosphorous Loading (lb/yr)									
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Springdale	46,003	53,697	49,348	50,331	61,626	60,185	66,282	65,155	59,521	53,684
Siloam Springs	23,819	27,568	26,853	18,833	30,341	27,496	27,593	28,279	31,544	31,726
Fayetteville Noland - West	7,328	11,145	9,811	11,861	8,245	8,768	5,990	4,979	5,252	5,841
Rogers	9,555	11,312	9,254	10,147	11,750	10,071	10,860	10,292	20,026	8,651
Lincoln	1,966	2,389	1,918	2,081	2,891	2,208	2,212	2,304	1,838	2,948
Prarie Grove	1,268	1,328	1,241	1,438	1,730	1,545	1,619	1,877	1,812	1,897
Tahlequah	-	-	-	-	-	-	-	-	-	1,989
Stillwell	-	-	-	-	-	-	-	-	-	-
Westville	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>89,939</b>	<b>107,439</b>	<b>98,424</b>	<b>94,692</b>	<b>116,583</b>	<b>110,274</b>	<b>114,557</b>	<b>112,887</b>	<b>119,993</b>	<b>106,737</b>

**NOTES:** Values in black are based on monthly flow and concentration averages, combined with the number of days in the corresponding months, per year.

Loading for 2007 is based on a partial year's data, and assumes consistency for overall year.

Fayetteville Noland-West Loading assumes 40% of Fayetteville Noland's loading, as the only Fayetteville Loading to reach the Illinois River.

Blue data are a function of actual flow rates (DMRs) and the average Phosphorous concentration from available DMR data.

Maroon colored data are a function of confirmed data from the Arkansas Water Resource Center for 1997 through 2001. Any other years that use these data are based on actual flows (DMR data), and the average phosphorous concentrations (derived from the 1997 to 2001 data).

TABLE 4 (Continued)

WWTP	ESTIMATE PHOSPORUS LOADING FROM IRW POTWS								
	Annual Phosphorous Loading (lb/yr)								
	1999	2000	2001	2002	2003	2004	2005	2006	2007
Springdale	79,998	91,128	101,363	80,054	73,229	36,192	34,407	20,002	8,824
Siloam Springs	33,976	32,663	30,665	29,478	26,522	23,808	30,294	29,679	30,935
Fayetteville Noland - West	4,908	5,846	3,587	3,947	4,510	5,364	5,257	6,025	3,396
Rogers	18,803	9,607	7,002	12,003	11,704	12,748	12,286	11,531	13,555
Lincoln	2,150	611	614	637	613	529	561	792	531
Prarie Grove	1,855	1,096	1,211	3,376	3,491	3,404	3,714	4,808	5,717
Tahlequah	3,008	4,109	2,586	2,743	1,668	2,612	2,791	2,355	2,831
Stillwell	-	-	1,989	4,219	2,842	2,685	2,137	1,453	1,578
Westville	1,022	860	868	1,691	1,073	636	658	647	985
<b>TOTAL</b>	<b>145,720</b>	<b>145,919</b>	<b>149,885</b>	<b>138,148</b>	<b>125,651</b>	<b>87,978</b>	<b>92,106</b>	<b>77,296</b>	<b>68,352</b>

NOTES: